SOME APPROACHES TO MULTI-POLLUTANT EPIDEMIOLOGY: PRODUCTS OF COAL COMBUSTION AND SMELTER OPERATION, PRODUCTS OF INTERNAL COMBUSTION ENGINES, AND SOURCE CATEGORY CONTRIBUTIONS

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Background and Aims: Due to current interest in multi-pollutant approaches to various aspects of air pollution, pollutant concentrations in Phoenix, AZ (1995-1998) have been analyzed for associations with cardiovascular mortality. Both the ability to determine accurately the independent effects of single pollutants and to estimate the joint effects of groups of pollutants are considered.
Methods: A priori regression models were used based on previous analyses conducted in Phoenix. Subsequent sensitivity analyses give changes in beta from varying model parameters and thus an indication of the reliability of model results.
Results: As, Se, Hg, and Sulfate are poorly correlated at the Phoenix measurement site. The joint effect (by including concentrations of all pollutants in a joint statistical model) gives a total beta very close to the sum of the individual pollutant betas. Therefore, betas for individual pollutants are meaningful and relative toxicities can be estimated. NO2, CO, and EC are highly correlated. The sum of the betas from a joint model is about equal to the largest single pollutant beta. Thus, it is difficult to obtain reliable betas for individual pollutants, only for their joint effect. Because of the high correlation between many pollutants, statistical models were used to produce poorly correlated factors which can often be associated with source categories (Source Category Models). Individual and joint results for factors from two such models are reported in interquartile range (IQR) units.
Conclusions: It is difficult to estimate individual for highly correlated pollutants. Regression models using poorly correlated factors from Source Category Models (each factor including multiple pollutants) provide suggestions regarding the relative toxicity of source categories. Joint models using source categories yield an indication of the total effects of all identifiedsources acting jointly. (In making this presentation, Dr. Wilson is representing himself.)